LARGEST DAILY WIND GENERATION RAMPS: SUMMARY

Based on 1-Min Average Data of BPA Total Wind Generation
Based on the Single Largest Ramp of Each Day, Positive (Up) & Negative (Down)
At 5-Min, 10-Min, 30-Min, & 60-Min Increments
In Actual MW & As PerCent of Total Wind Capacity

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Methodology Summary: Begin with 1-min integrated average data for BPA Total Wind Generation (Point 79687) via SCADA/PI. At each minute, calculate the difference between the current wind gen and the gen of exactly 5 minutes, 10 minutes, 30 minutes, and 60 minutes back. These differences are the "ramps" over the 5-min, 30-min, 10-min, and 60-min time horizons. Record each ramp in MW and as a Percent of the Total Installed Wind Gen Capacity for that day. Finally, calculate, for each day, the single largest observed ramp, in both MW and PerCent of Capacity, for each of the four time horizons. The analysis period begins 10/5/2007, the date of a major wind gen capacity expansion. Wind ramps can be trigged by operational issues, not just meteorological phenomena.

Beginning 10/5/2007; Last Update: 11/30/2010

Top 5 Single Largest Daily Positive (UP) Ramps

60-Min Horizon

By MW

Date	60-Min Up Ramp MW
5/19/2010	**1580**
11/7/2010	1486
10/24/2010	1412
3/16/2010	1385
12/21/2009	1238

By PerCent of Capacity

Date	Wind Capacity	60-Min Up Ramp MW	60-Min Up Ramp as PerCent of Capacity
12/29/2008	1599	1066	**67%**
3/20/2008	1301	851	65%
3/7/2008	1301	748	57%
5/19/2010	2780	1580	57%
5/2/2009	2105	1144	54%

30-Min Horizon

By MW

Date	30-Min Up Ramp MW
11/7/2010	**1117**
5/19/2010	1053
3/16/2010	919
5/26/2010	911
4/8/2010	910

By PerCent of Capacity

Date	Wind Capacity	30-Min Up Ramp MW	30-Min Up Ramp as PerCent of Capacity
3/20/2008	1301	661	**51%**
12/29/2008	1599	806	50%
3/2/2009	1871	767	41%
5/2/2009	2105	816	39%
5/19/2010	2780	1053	38%

10-Min Horizon

By MW

Date	10-Min Up Ramp MW
5/19/2010	**756**
5/26/2010	614
6/10/2010	609
5/20/2010	603
5/16/2010	587

By PerCent of Capacity

Date	Wind Capacity	10-Min Up Ramp MW	10-Min Up Ramp as PerCent of Capacity
5/19/2010	2780	756	**27%**
11/22/2009	2284	567	25%
3/20/2008	1301	315	24%
6/21/2008	1496	361	24%
10/2/2008	1496	336	22%

5-Min Horizon

By MW

Date	5-Min Up Ramp MW
5/19/2010	**428**
11/22/2009	421
5/26/2010	411
5/16/2010	406
11/7/2010	405

By PerCent of Capacity

Date	Wind Capacity	5-Min Up Ramp MW	5-Min Up Ramp as PerCent of Capacity
10/2/2008	1496	314	**21%**
11/22/2009	2284	421	18%
1/16/2008	1301	203	16%
5/19/2010	2780	428	15%
12/21/2009	2617	402	15%

Top 5 Single Largest Daily Negative (DOWN) Ramps

60-Min Horizon

By MW

Date	60-Min Down Ramp MW
5/16/2010	**-1161**
10/24/2010	-1113
3/29/2010	-1097
3/12/2010	-1004
10/25/2010	-959

By PerCent of Capacity

Date	Wind Capacity	60-Min Down Ramp MW	60-Min Down Ramp as PerCent of Capacity
6/11/2008	1496	-729	**-49%**
6/4/2009	2105	-887	-42%
6/21/2008	1496	-628	-42%
5/16/2010	2780	-1161	-42%
3/29/2010	2780	-1097	-39%

30-Min Horizon

By MW

Date	30-Min Down Ramp MW
4/27/2010	**-937**
10/24/2010	-861
5/19/2010	-815
6/11/2008	-739
10/25/2010	-715

By PerCent of Capacity

Date	Wind Capacity	30-Min Down Ramp MW	30-Min Down Ramp as PerCent of Capacity
6/11/2008	1496	-739	**-49%**
4/27/2010	2780	-937	-34%
6/21/2008	1496	-455	-30%
5/19/2010	2780	-815	-29%
6/4/2009	2105	-581	-28%

10-Min Horizon

By MW

Date	10-Min Down Ramp MW
6/11/2008	**-727**
11/7/2010	-721
5/19/2010	-646
12/21/2009	-616
4/27/2010	-600

By PerCent of Capacity

Date	Wind Capacity	10-Min Down Ramp MW	10-Min Down Ramp as PerCent of Capacity
6/11/2008	1496	-727	**-49%**
12/21/2009	2617	-616	-24%
5/19/2010	2780	-646	-23%
11/7/2010	3151	-721	-23%
10/17/2009	2284	-516	-23%

5-Min Horizon

By MW

Date	5-Min Down Ramp MW
6/11/2008	**-724**
11/7/2010	-583
6/10/2010	-536
3/16/2010	-532
5/19/2010	-487

By PerCent of Capacity

Date	Wind Capacity	5-Min Down Ramp MW	5-Min Down Ramp as PerCent of Capacity
6/11/2008	1496	-724	**-48%**
3/7/2009	1871	-376	-20%
10/2/2008	1496	-295	-20%
3/16/2010	2780	-532	-19%
6/10/2010	2830	-536	-19%